# Effective transition cow management to maximize Internal Herd Growth

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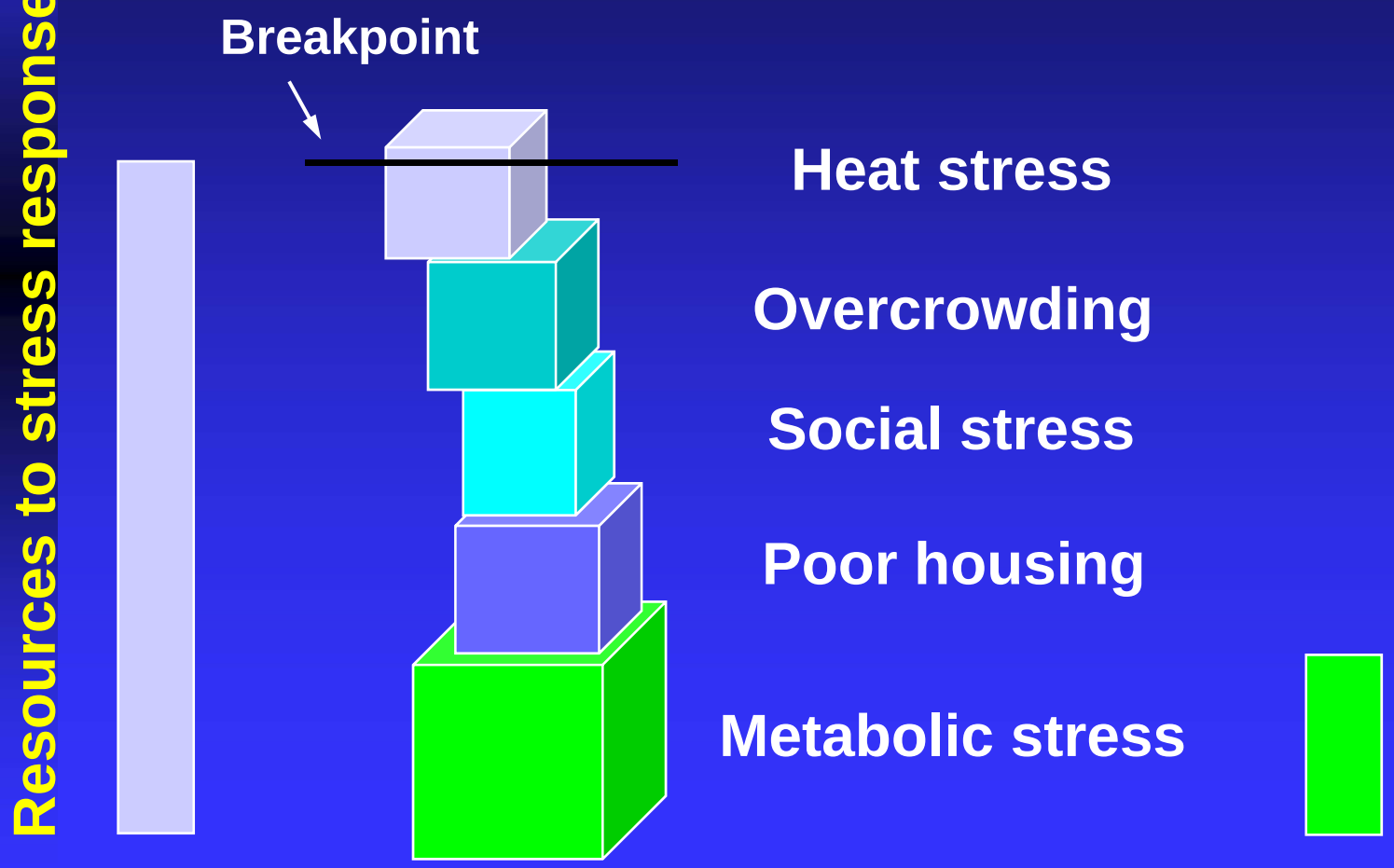
# Our charge

- Devise and employ nutritional management strategies and nutritional tools to support metabolic adaptation to lactation
  - *Macromineral metabolism (manage DCAD)*
  - *Glucose metabolism (provide fermentable carbohydrate)*
  - *Fat metabolism (minimize BCS loss)*
- Minimize potential negative effects of nonnutritional factors on metabolic adaptation to lactation
  - *Overcrowding*
  - *Environmental stress (temp., ventilation)*
  - *Infectious challenge/hygiene*
  - *Grouping/regrouping*
  - *Comfort*

# Big rocks from the nutritional side (common themes in our case farms)

- Manage DCAD
  - Start with including low potassium forages in dry period diets
- Sufficient energy and protein intake from a dry period diet of moderately high nutrient density
- Thinner (within reason) is better
- Trends toward shortened dry periods and one-group nutritional strategies for dry cows

# Effects of multiple stressors accumulate...



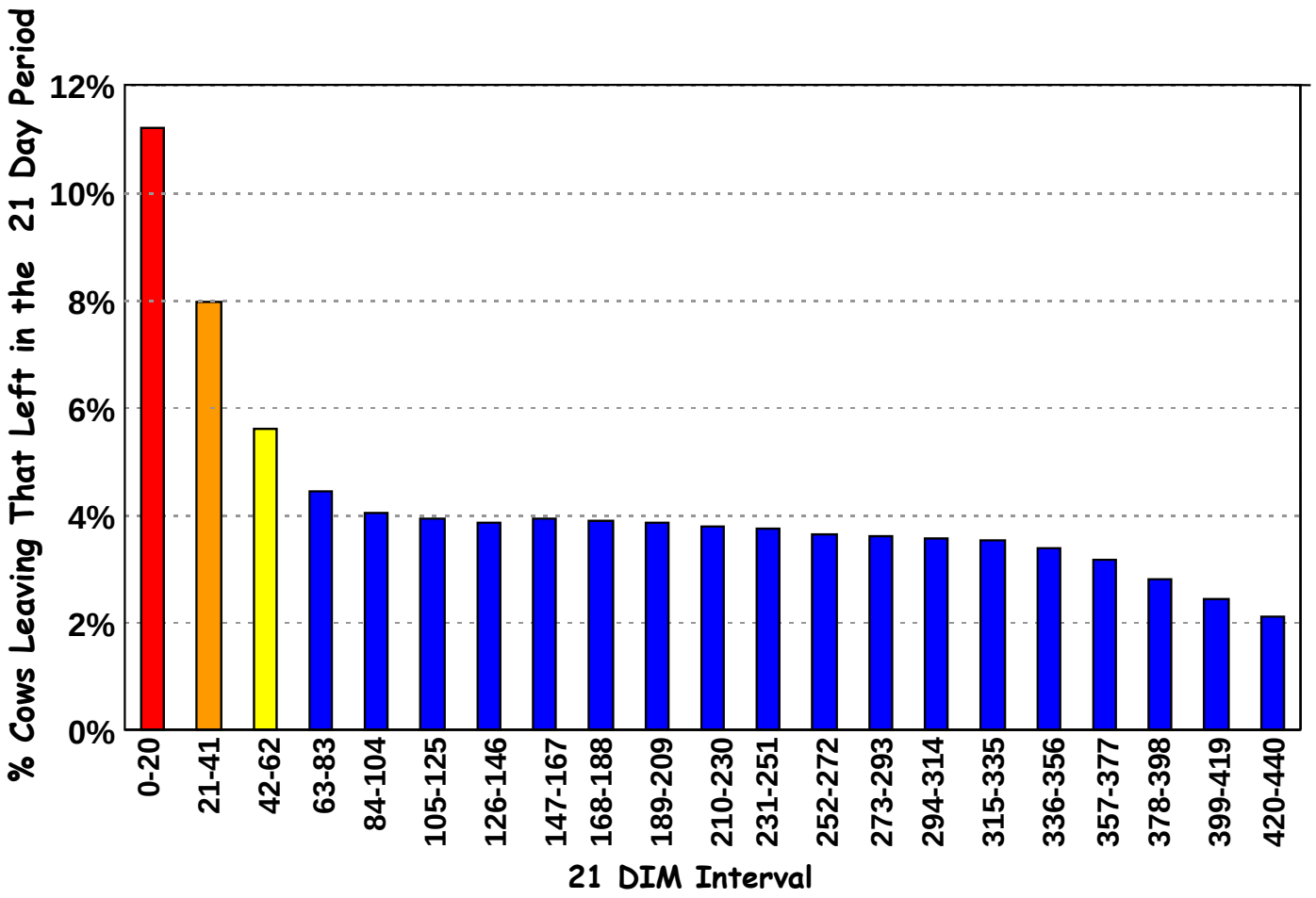

Drackley, 2002

# Transition period indices relating to Internal Herd Growth

- Nondairy cull rate during first 60 days in milk
- Incidence of metabolic disorders
  - Related to likelihood of high milk production
  - Tied to reproductive performance

# When Cows Leave the Herd

*(MN DHIA 10/96 - 10/01) Godden et al., 2003*



# Nondairy cull rate during the first 60 days in milk

- Captures dead cows and cows sold for nondairy during first 60 days in milk
- Crude index of overall transition management
- Minnesota workers (previous slide) reported that 25% of cows that leave herds leave during the first 60 days in milk
- We look at the number of cows dead and sold for nondairy as a percentage of the number of calvings

# Fresh cow loss as a percentage of calvings

- Typical values in well-managed herds are 10 to 12% (unacceptable)
- Best herds consistently average 5 to 6%
- Can be as high as 25% during train wrecks

# Our case farms

| | Farm | | |
|---|---|---|---|
| | Hanehan | Durfee | Adams |
| Dead and sold/calvings | 74/605 | 20/213 | 5/107 |
| Percentage | 12.2% | 9.4% | 4.7% |

# Incidence of metabolic disorders

- Combination of objective (retained placenta, displaced abomasum) and subjective (hypocalcemia, ketosis, metritis)
- Goals for each usually set by survey data

# Transition cow survey

- Conducted by Buzz Burhans and colleagues
- 27 herds in Vermont and New Hampshire
- Over 600 cows in the dataset

## Occurrence of Disorders at the Herd Level

| | Holsteins | | | | Jerseys | | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Event | N | min | p50 | max | N | min | p50 | max | N | min | p50 | max |
| Ketosis | 13 | 2.10% | 14.70% | 50.00% | 4 | 6.30% | 8.30% | 15.80% | 17 | 2.10% | 13.20% | 50.00% |
| Milk Fever | 14 | 2.60% | 10.10% | 26.30% | 6 | 8.10% | 37.70% | 60.00% | 20 | 2.60% | 11.10% | 60.00% |
| Off Feed | 7 | 2.30% | 4.80% | 21.40% | 4 | 2.70% | 6.50% | 10.50% | 11 | 2.30% | 6.30% | 21.40% |
| Displaced Abomasum | 10 | 3.60% | 8.10% | 14.30% | 2 | 2.70% | 2.90% | 3.10% | 12 | 2.70% | 7.30% | 14.30% |
| Digestive/Diarrhea | 9 | 2.10% | 5.60% | 11.80% | 2 | 3.10% | 4.20% | 5.30% | 11 | 2.10% | 5.30% | 11.80% |
| Mastitis | 10 | 2.60% | 7.10% | 15.80% | 5 | 5.30% | 10.00% | 13.50% | 15 | 2.60% | 7.10% | 15.80% |
| Edema | 7 | 5.10% | 7.10% | 40.90% | 2 | 22.20% | 25.20% | 28.10% | 9 | 5.10% | 13.20% | 40.90% |
| Dystocia | 13 | 2.10% | 5.60% | 16.70% | 2 | 2.70% | 4.70% | 6.70% | 15 | 2.10% | 5.60% | 16.70% |
| Twins | 12 | 2.10% | 5.70% | 18.80% | 1 | 3.10% | 3.10% | 3.10% | 13 | 2.10% | 5.60% | 18.80% |
| Stillbirths | 8 | 2.60% | 6.50% | 12.50% | 3 | 3.10% | 5.40% | 6.70% | 11 | 2.60% | 5.90% | 12.50% |
| Retained Placenta | 13 | 2.90% | 11.80% | 23.70% | 1 | 3.10% | 3.10% | 3.10% | 14 | 2.90% | 11.20% | 23.70% |
| Metritis | 14 | 4.30% | 11.20% | 39.30% | 3 | 3.10% | 5.40% | 15.80% | 17 | 3.10% | 11.10% | 39.30% |
| Abortions | None Reported | | | | None Reported | | | | | | | |

Burhans et al., 2003

## Health Events by Category at the Herd Level

| | Holsteins | | | | Jerseys | | | | Total | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Factor | N | min | p50 | max | N | min | p50 | max | N | min | p50 | max |
| Problem Cow | 19 | 18.80% | 47.40% | 73.70% | 6 | 24.30% | 47.00% | 60.00% | 25 | 18.80% | 47.40% | 73.70% |
| Metabolic Problem | 18 | 14.70% | 30.30% | 65.80% | 6 | 12.50% | 40.00% | 60.00% | 24 | 12.50% | 32.20% | 65.80% |
| Infectious Problem | 16 | 4.30% | 16.20% | 39.30% | 5 | 6.70% | 12.50% | 16.20% | 21 | 4.30% | 14.30% | 39.30% |
| Energy Problem | 18 | 3.70% | 19.60% | 53.80% | 5 | 5.40% | 6.70% | 15.80% | 23 | 3.70% | 14.70% | 53.80% |
| Bad Calving | 17 | 3.40% | 11.10% | 25.00% | 3 | 5.40% | 6.30% | 13.30% | 20 | 3.40% | 11.10% | 25.00% |
| Preventable Problem | 18 | 14.70% | 36.00% | 68.40% | 6 | 18.80% | 40.00% | 60.00% | 24 | 14.70% | 36.00% | 68.40% |

**Problem Cow**: Any problem (Dystocia, Mastitis, Abortion, Twinning, Stillbirths, Retained Placenta, Milk Fever, Digestive, Ketosis,Metritis,Edema, Displaced Abomasum, Off Feed)

**Metabolic Problem**: (Milk Fever, Retained Placenta, Digestive, Ketosis, Displaced Abomasum and Off Feed)

**Infectious Problem**: All cows with Mastitis, Metritis

**Energy Problem**: (Digestive, Ketosis, Off Feed, Displaced Abomasum)

**Bad Calving**: (Dystocia, Abortion, Twinnings, Stillbirths)

**Preventables**: (Mastitis, Retained Placenta, Milk Fever, Digestive/Diarrhea, Ketosis, Metritis, DA, Off Feed)

Burhans et al., 2003

# Achievable goals for metabolic disorders

- Milk fever -- < 5%
- Retained placenta/metritis -- < 9%
- Displaced abomasum -- < 5%
- Clinical ketosis (blood BHBA > 27 mg/dl) -- < 5%
- Subclinical ketosis (blood BHBA > 14.4 mg/dl) -- < 15%

# Our case farms

| | Farm | | |
|---|---|---|---|
| | Hanehan | Durfee | Adams |
| Milk fever | 2.8 | < 5 | 1.8 |
| RP | 11.7 | ~ 10 | 10.0 |
| Metritis | 2.6 | | |
| DA | 5.6 | ~ 5 | 4.5 |
| Ketosis | 11.6 | | |

## Fresh Cow Protocol

**Check Temperatures for 10 Days**

**Fever**

Looks Sick
- Pump 10 gal. for 5 days
- Tube of Ca day 1 in pump
- Hypersaline for 2 days
- Banamine for 3 days
- Polyflex for 4 days
- Dextrose w/100 cc oxy-tet if fever not down 2nd day
- ECP (3cc) on day 3
- Check for DA

Looks OK
- Recheck temp next day
- Talk to Pat@
- ECP (3cc) on day 3
- Check for Mastitis
- Check for DA

**No Fever**

Looks Sick
- Pump 10 gal. for 5 days
- Tube of Ca day 1 in pump
- Hypersaline for 2 days
- ECP (3cc) on day 3
- Check for DA

Looks OK
- Recheck temp next day

**All Fresh Cows Get Pumped for 3 days**

5 gal. water
3½ cups fresh cow mix
16 oz. propylene glycol

**Sick Pump**

10 gal. water
7 cups fresh cow mix
16 oz. propylene glycol

## Vacas Frescas

**Chequee la Temperatura por 10 dias**

**Tiene Fiebre**

Parece Enferma
- Bombee 10 galones por 5 dias
- Agregue tubo de Calcio el primer dia
- Hiporsalino por 2 dias
- Banamine por 3 dias
- Polyflex por 4 dias
- Dextrose con 100 cc de oxy-tet si sigue el fiebre $2^0$ dia
- ECP (3cc) el $3^0$ dia
- Chequee para un Abomaso Desplazado (DA)

Parece Bien
- Chequee la temperarura el siguente dia
- Hable con Pat
- ECP (3cc) el $3^0$ dia
- Chequee para la Mastitis
- Chequee para un Abomaso Desplazado (DA)

**No Tiene Fiebre**

Parece Enferma
- Bombee 10 galones por 5 dias
- Agregue tubo de Calcio el primer dia
- Hiporsalino por 2 dias
- ECP (3cc) el $3^0$ dia
- Chequee para un Abomaso Desplazado (DA)

Parece Bien
- Chequee la temperarura el siguente dia

**Todas las vacas frescas son bombeadas por 3 dias**

5 galones de aqua
3½ tazas de la mezcla para vacas frescas
16 oz glicol

**Para vacas enfermes**

10 galones de aqua
7 tazas de la mezcla para vacas frescas
16 oz glicol

Framework for actualizing “optimum” nutritional management strategies on commercial dairy farms in the context of shortened dry periods

# What are our nutritional goals and how do we achieve them?

- The Goals
  - Moderately high DMI of well-formulated close-up diets while attempting to minimize extent of DMI decrease during the prepartum period
- How do we achieve them?
  - *Many herds still struggle to get ENOUGH dry matter intake in close-up cows (goal Holstein 26 to 28 lb/d of suggested close-up cow diet)*
  - *In herds where close-up cows are consuming large amounts of DM ( > 30 to 33 lb/d), limit grain-type forages and other very palatable feeds to control intake within goal and complement with a consistent, low potassium forage source (preferably bulky)*
- The challenge – extent of  DMI decrease extremely difficult to characterize in group-fed animals

# Far-Off Dry Cows

- Dry-off until ~ 3 weeks pre-freshening
- Ration considerations
  - $NE_L$ 0.59 to 0.63 Mcal/lb for maintenance BCS
  - Do not want to overfeed (Dann et al., 2003)

# General goals for diet formulation for closeup cows and one-group dry cow systems up to 40 days

| | Partial anionic | Full anionic |
|---|---|---|
| • $NE_{L,}$ Mcal/lb | 0.68 to 0.70 | |
| • Metabolizable protein, g/d | 1100 to 1200 | |
| • NFC, % | 34 to 36 | |
| • Starch, % | 19 to 21 | |
| • Dietary Ca, g/d | 100 | 140 |
| • Dietary Ca, % | 0.90 | 1.2 |
| • Dietary P, % | 0.30 to 0.35 | |
| • Mg, % | 0.40 to 0.42 | |
| • Cl, % | 0.3 | 0.8 to 1.2 |
| • K, % | < 1.3 | < 1.3 |
| • Na, % | 0.10 to 0.15 | |
| • S, % | 0.20 | 0.3 to 0.4 |
| • Vitamin A (IU/d) | 100000 | 100000 |
| • Vitamin D (IU/d) | 30000 | 30000 |
| • Vitamin E (IU/d) | 1800 | 1800 |

Prefer use of organic trace elements, including organic Se

# Advantages of shorter dry period

- Avoid forfeiting milk during late lactation
- Simplify dry cow management and decrease cost of dry cow housing (one dry cow group)
- Decrease sociological stress associated with multiple group changes, etc.
- More closely match dry period length with biologically required length (~ 25 days)

# Summary of research on planned shorter dry period length

- Milk yield similar between cows managed for 40 vs. 60 days dry – 65 herds in NY
  - *Coppock et al., 1974*
- Milk yield after 49- or 70-d dry periods comparable; 28-d dry reduced subsequent milk yield
  - *Sorensen and Enevoldsen, 1991*
- Milk yield comparable for cows managed for 60 vs. 30 to 35 d-dry periods
  - *Shairer, 2001; Bachman, 2002; Gulay et al., 2003*
- Comparable milk yield for 60 vs. 30-d dry; continuous lactation decreased subsequent milk yield (differences greater in primiparous cows)
  - *Annen et al., 2003; Rastani and Grummer, 2003*

# Cornell study

- Two commercial dairy farms (cows over 27 kg/d at 60 d before expected calving)
  - Treatments
    - 60 d dry period, label bST (two group dry cow management)
    - 40 d dry period, label bST (moved to closeup group at 40-d dry
    - Continuous lactation, label bST (stop bST at calving and resume during 9$^{th}$ week of lactation) – remained on lactating cow ration for the duration

Fernandez et al., 2004

Least squares means for milk yield and milk composition during the first 6 months of the subsequent lactation for cows managed for 60, 40, or zero days dry.[1]

| | Treatment | | | |
|---|---|---|---|---|
| Item | 60-d dry | 40-d dry | 0-d dry | SEM |
| # of cows | 22 | 23 | 22 | |
| Average days dry | 57 | 41 | 1 | |
| Milk yield, kg/d | 47.1[a] | 46.3[a] | 37.1[b] | 1.8 |
| Fat, % | 3.51 | 3.62 | 3.40 | 0.14 |
| Fat yield, kg/d | 1.68[a] | 1.62[a] | 1.28[b] | 0.09 |
| True protein, % | 2.74[a] | 2.84[b] | 2.83[b] | 0.06 |
| True protein yield, kg/d | 1.31[a] | 1.30[a] | 1.06[b] | 0.04 |

[1]Means within a row with different superscripts differ, P <0.05.

Fernandez et al., 2004

# The Economics – 60 versus 40 days dry

| | Average milk yield, lb/d | |
|---|---|---|
| Item | 50 | 60 |
| Marginal income | | |
| Milk ($0.14/lb) | $140 | $168 |
| | | |
| Marginal expense | | |
| Lactating diet | $48 | $56 |
| Closeup diet | $14 | $14 |
| Variable cost | $15 | $15 |
| Total expenses | $77 | $85 |
| | | |
| Net per cow | $63 | $83 |

# Current thinking on management considerations for 40-d dry period

- Either two-group or one-group nutritional strategies acceptable
  - Marginal feed cost approximately $15 per cow for 20 additional days fed close-up diet
  - One-group dry cow program fits better with shortened dry period
- Moderate NFC/energy close-up diet acceptable to feed for 40 d dry, regardless of DCAD strategy
- Continue to require far-off type diet to feed to cows with dry periods longer than 40 days